

Claims

What is claimed is:

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1. An arrangement for display with selectable three-dimensionally visible or two-dimensional modes, comprising:

- an illuminating device (1) emitting light distributed over an area,
- at least one filter array (2) arranged – in viewing direction (B) – before the illuminating device (1) and intended to impart a structure to the light originating from the illuminating device (1),

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- at least one diffusing layer (3a, 3b) arranged – in viewing direction (B) – before the filter array (2),
- a transmissive image display device (4) arranged – in viewing direction (B) – before or behind the diffusing layer (3a, 3b), preferably in the form of a TFT-LCD panel,

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characterized in that

- the distance a between the filter array (2) and the diffusing layer (3a, 3b) is variable, so that

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- in a first position, in which the diffusing layer (3a, 3b) is arranged at a distance from the filter array (2), the structure imparted by the filter array (2) to the light originating from the illuminating device (1) is essentially cancelled due to the light diffusion effect of the diffusing layer (3a, 3b), preferably below the contrast threshold of human vision, and a two-dimensional image is shown on the image display device (4) in the full resolution provided by it, and

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- in a second position, in which the diffusing layer (3a, 3b) is arranged in contact with, or at least close to the filter array (2), the structure imparted by the filter array (2) to the light originating from the illuminating device (1) is essentially not cancelled, so that the image display device (4) shows an image that can be seen in three dimensions.

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2. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – behind the diffusing layer (3a), characterized in that

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- the image display device (4), the diffusing layer (3a) and the illuminating device (1) are immovable,

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- the filter array (2) is provided on a transparent substrate (6), and
- the transparent substrate (6) with the filter array (2) is movable for the purpose of varying the distance a relative to the diffusing layer (3a).

5 3. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – behind the diffusing layer (3a), characterized in that

- the filter array (2) is provided on a transparent substrate (6),
- the transparent substrate (6) with the filter array (2) is rigidly connected to the illuminating device (1), and
- the transparent substrate (6), the filter array (2) and the illuminating device (1) are jointly movable for the purpose of varying the distance a relative to the diffusing layer (3a) and the image display device (4).

15 4. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – behind the diffusing layer (3a), characterized in that

- the diffusing layer (3a) and the image display device (4) are rigidly connected to each other,
- the filter array (2) is provided on a transparent substrate (6),
- the transparent substrate (6) with the filter array (2) is rigidly connected to the illuminating device (1), and
- the diffusing layer (3a) and the image display device (4) are jointly movable for the purpose of varying the distance a relative to the filter array (2), the transparent substrate (6) and the illuminating device (1).

25 5. An arrangement as claimed in any of claims 2 through 4, characterized in that the image display device (4) is an LCD panel, and the diffusing layer (3a) corresponds to the antiglare matte finish of the said LCD panel.

30 6. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – before the diffusing layer (3b), characterized in that

- the diffusing layer (3b) is provided on a transparent substrate (5),
- the filter array (2) is arranged on the illuminating device (1), and

- the substrata (5) and the diffusing layer (3b), and optionally the image display device (4) are movable for the purpose of varying the distance a relative to the filter array (2) and the illuminating device (1).

5 7. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – before the diffusing layer (3b), characterized in that

- the image display device (4), the diffusing layer (3b) and the illuminating device (1) are immovable,
- 10 – the filter array (2) is provided on a transparent substrate (6), and
- the transparent substrate (6) with the filter array (2) is movable for the purpose of varying the distance a relative to the diffusing layer (3b).

15 8. An arrangement as claimed in claim 1, provided with a transmissive image display device (4) arranged – in viewing direction (B) – before the diffusing layer (3b), characterized in that

- the filter array (2) is provided on a transparent substrate (6),
- the transparent substrate (6) with the filter array (2) is rigidly connected to the illuminating device (1), and
- 20 – the transparent substrate (6), the filter array (2) and the illuminating device (1) are jointly movable for the purpose of varying the distance a relative to the diffusing layer (3b) and the image display device (4).

25 9. An arrangement as claimed in any of claims 6 through 8, characterized in that the substrate (5) is designed as a glass substrate and the diffusing layer (3b) is designed as a diffusing film or as a sheet of grease-proof paper, each laminated onto the glass substrate, or as a ground or etched surface of the glass substrate.

30 10. An arrangement as claimed in any of the above claims, characterized in that

- the distance a in the first position is preferably within a range of 10 mm to 30 mm, and
- the distance a is, in the second position, 0.2 mm or greater.

35 11. An arrangement as claimed in any of the above claims, characterized in that the diffusing layer (3a, 3b) is designed to be permanently diffusing.

12. An arrangement as claimed in any of claims 1 through 10, characterized in that the diffusing layer (3a, 3b) is designed to be controllable, so as to be diffusing in a first mode in the first position of the arrangement, and to act as a transparent medium in a second mode in the second position of the arrangement.

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13. An arrangement as claimed in claim 12, characterized in that two diffusing layers (3a1, 3a2) are provided, with the - in viewing direction (B) - first diffusing layer (3a1) corresponding to the antiglare matte finish of an LCD panel, and the second, controllable diffusing layer (3a2) being arranged between the front polarizer and the said antiglare matte finish of the LCD panel.

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14. An arrangement as claimed in any of the above claims, characterized in that the diffusing layer (3a, 3b) is segmented in area segments, and that the first and second positions can be set independently for selectable area segments of the diffusing layer (3a, 3b), so that parts of the area can be switched from three-dimensionally visible to two-dimensional display and vice versa.

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20 15. An arrangement as claimed in any of the above claims, characterized in that the filter array (2) is an exposed or plotted, and processed photographic film, containing transparent and opaque area segments, which are arranged in a defined two-dimensional structure.

25 16. An arrangement as claimed in any of the above claims, characterized in that the distance z between the filter array (2) and the image display device (4) in the second position of the arrangement is between (including) 0.0 mm and (including) 20 mm.

30 17. An arrangement as claimed in any of the above claims, characterized in that, for the purpose of virtual homogeneous enlargement of the filter array (2) or of the luminous area of the illuminating device (1), a mirror well is arranged surrounding the filter array (2), which reflects the light of the illuminating device (1) or that part of this light which penetrates the filter array (2), so that any vignetting becomes invisible.

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18. An arrangement as claimed in claim 17, characterized in that the mirror well comprises first-surface mirrors of high reflectance, preferably $\rho > 98\%$, arranged normal to the surface of the filter array (2) and surrounding the same.
- 5 19. An arrangement as claimed in any of the above claims, characterized in that a stepper motor, a piezo-electric element, a solenoid or a pump is provided for executing the movements.
- 10 20. An arrangement as claimed in any of claims 1 through 18, characterized in that the movement is executed manually.
- 15 21. An arrangement as claimed in any of the above claims, characterized in that the illuminating device (1) emitting light distributed over an area and the filter array (2) arranged before it are replaced by a light source emitting structured light corresponding to the filter array structure.